

State Registration Number  
N6996

**RENEWABLE OPERATING PERMIT  
STAFF REPORT**

ROP Number  
MI-ROP-N6996-2024

**Poet Biorefining - Caro, LLC**

State Registration Number (SRN): N6996

Located at

1551 Empire Drive, Caro, Tuscola County, Michigan 48723

Permit Number: MI-ROP-N6996-2024

Staff Report Date: September 16, 2024

This Staff Report is published in accordance with Sections 5506 and 5511 of Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451). Specifically, Rule 214(1) of the administrative rules promulgated under Act 451, requires that the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Air Quality Division (AQD), prepare a report that sets forth the factual basis for the terms and conditions of the Renewable Operating Permit (ROP).

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**RENEWABLE OPERATING PERMIT**  
**SEPTEMBER 16, 2024 - STAFF REPORT**

ROP Number  
MI-ROP-N6996-2024

**Purpose**

Major stationary sources of air pollutants, and some non-major sources, are required to obtain and operate in compliance with an ROP pursuant to Title V of the federal Clean Air Act; and Michigan’s Administrative Rules for Air Pollution Control promulgated under Section 5506(1) of Act 451. Sources subject to the ROP program are defined by criteria in Rule 211(1). The ROP is intended to simplify and clarify a stationary source’s applicable requirements and compliance with them by consolidating all state and federal air quality requirements into one document.

This Staff Report, as required by Rule 214(1), sets forth the applicable requirements and factual basis for the draft ROP terms and conditions including citations of the underlying applicable requirements, an explanation of any equivalent requirements included in the draft ROP pursuant to Rule 212(5), and any determination made pursuant to Rule 213(6)(a)(ii) regarding requirements that are not applicable to the stationary source.

**General Information**

Stationary Source Mailing Address:	Poet Biorefining - Caro, LLC 1551 Empire Drive Caro, Michigan 48723
Source Registration Number (SRN):	N6996
North American Industry Classification System (NAICS) Code:	325193
Number of Stationary Source Sections:	1
Is Application for a Renewal or Initial Issuance?	Renewal
Application Number:	202300072
Responsible Official:	Doug DeLand, General Manager 989-286-3903
AQD Contact – District Inspector:	Adam Shaffer, Environmental Engineer 989-225-4789
AQD Contact – ROP Writer:	Shamim Ahammod, Senior Environmental Engineer 586-212-0508
Date Application Received:	April 12, 2023
Date Application Was Administratively Complete:	April 12, 2023
Is Application Shield in Effect?	Yes
Date Public Comment Begins:	September 16, 2024
Deadline for Public Comment:	October 16, 2024

## Source Description

POET Biorefining – Caro, LLC (Poet) is an ethanol production facility with a capacity of 95 million gallons per year. The facility is located in the middle of Tuscola County and started operation in 2002. The area surrounding POET Biorefining – Caro, LLC (Poet) is rural and sparsely populated with residential properties. The nearest residence is approximately 700 feet west of POET Biorefining – Caro, LLC (Poet).

The facility was originally permitted under Air Use Permit to Install (PTI) No. 210-01. Since then, the facility has undergone several updates to equipment and processes, and became a major ROP source with the startup of the no-cook BPX process on October 21, 2005.

The facility receives and stores corn, then produces ethanol and denatured ethanol via a process that includes milling, fermentation, separation, evaporation, and various other processes. There are two scrubbers (one as a backup), a regenerative thermal oxidizer (RTO), a thermal oxidizer/heat recovery boiler (TO/HRB), and various fabric filters used to control volatile organic compounds (VOCs) and particulate matter emissions at the facility.

The following table lists stationary source emission information as reported in the Annual Air Emissions Report for the year **2023**.

### TOTAL STATIONARY SOURCE EMISSIONS

Pollutant	Tons per Year
Carbon Monoxide (CO)	57.64
Lead (Pb)	0.00047
Nitrogen Oxides (NO <sub>x</sub> )	70.36
PM10*	35.24
Sulfur Dioxide (SO <sub>2</sub> )	0.56
Volatile Organic Compounds (VOCs)	107.51

\* Particulate matter (PM) that has an aerodynamic diameter less than or equal to a nominal 10 micrometers.

The following table lists potential Hazardous Air Pollutant emissions as calculated for the year 2023 by POET Biorefining - Caro:

Individual Hazardous Air Pollutants (HAPs) **	Tons per Year
Acetaldehyde	8.66
Acrolein	1.26
Benzene	0.15
Ethylbenzene	0.01
Formaldehyde	0.46
Hexane	2.14
Methanol	0.57
Toluene	0.15
Xylenes	0.06
<b>Total Hazardous Air Pollutants (HAPs)</b>	<b>13.94</b>

\*\*As listed pursuant to Section 112(b) of the federal Clean Air Act.

See Parts C and D in the ROP for summary tables of all processes at the stationary source that are subject to process-specific emission limits or standards.

## **Regulatory Analysis**

The following is a general description and history of the source. Any determinations of regulatory non-applicability for this source are explained below in the Non-Applicable Requirement part of the Staff Report and identified in Part E of the ROP.

The stationary source is in Tuscola County, which is currently designated by the United States Environmental Protection Agency (USEPA) as attainment/unclassified for all criteria pollutants.

The stationary source is subject to Title 40 of the Code of Federal Regulations (CFR) Part 70, because the potential to emit of nitrogen oxides (NO<sub>x</sub>), sulfur dioxides (SO<sub>2</sub>), volatile organic compounds (VOCs), and carbon monoxide (CO) exceeds 100 tons per year.

The stationary source is considered a "synthetic minor" source in regards to the Prevention of Significant Deterioration (PSD) regulations of the Michigan Air Pollution Control Rules Part 18, Prevention of Significant Deterioration of Air Quality because the stationary source accepted legally enforceable permit conditions limiting the potential to emit of sulfur dioxide (SO<sub>2</sub>) to less than 250 tons per year. The source is limited to 224.9 tons per year of SO<sub>2</sub> emissions with restrictions on material usage and associated monitoring and recordkeeping.

Emission units in FGFERM&DIST, FGETHLOAD, FGNSPSTANKS, and FGETHANOLTANKS at the stationary source are subject to the Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006, promulgated in 40 CFR Part 60, Subparts A and VVa.

No emission units at the stationary source were subject to the Prevention of Significant Deterioration regulations of the Michigan Air Pollution Control Rules Part 18, Prevention of Significant Deterioration of Air Quality of Act 451 or 40 CFR 52.21 because at the time of New Source Review permitting the potential to emit of all criteria pollutants was less than 250 tons per year.

FGNSPSTANKS, and FGETHANOLTANKS at the stationary source are subject to the Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for which Construction, Reconstruction, or Modification commenced after July 23, 1984, promulgated in 40 CFR Part 60, Subparts A and Kb.

Emission units in FGDDGSDRYERS and EUBOILER at the stationary source are subject to the Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units promulgated in 40 CFR Part 60, Subparts A and Dc.

Emission units in FGCORN-DDGS at the stationary source are subject to the Standards of Performance for Grain Elevators promulgated in 40 CFR Part 60, Subparts A and DD.

An existing emergency stationary reciprocating internal combustion engine (RICE) designated EUGENSET at the stationary source is subject to the National Emission Standard for Hazardous Air Pollutants (NESHAP) for Stationary Reciprocating Internal Combustion Engines (RICE) promulgated in 40 CFR Part 63, Subparts A and ZZZZ.

The stationary source had received several violation notices (VN) over the past few years. However, all VNs have been resolved and addressed.

The monitoring conditions contained in the ROP are necessary to demonstrate compliance with all applicable requirements and are consistent with the "Procedure for Evaluating Periodic Monitoring Submittals."

FGSCALP does not have emission limitations or standards that are subject to the federal Compliance Assurance Monitoring rule pursuant to 40 CFR Part 64 because the FGSCALP does not have potential pre-control emissions over the major source thresholds. The emission units in FGSCALP are controlled using a fabric filter collector (CE002). The pre-control emissions of PM2.5 and PM10 are 16.89 tons per year and 26.28 tons per year respectively.

EUDDGSSILO does not have emission limitations or standards subject to the federal Compliance Assurance Monitoring rule pursuant to 40 CFR Part 64 because EUDDGSSILO does not have potential pre-control emissions over the major source thresholds. The control devices are fabric filter collectors (F-849 and F-620). The pre-control emissions of PM2.5 and PM10 are 29.06 tons per year and 64.57 tons per year respectively.

The following Emission Units/Flexible Groups are subject to CAM:

Emission Unit/Flexible group ID	Pollutant/ Emission Limit	UAR(s)	Control Equipment	Monitoring (Include Monitoring Range)	Emission Unit/Flexible Group for CAM	PAM ? *
EUFBCOOLER	PM /0.0060 lbs per 1000 lbs of gas	R 336.1331	Fabric Filter Collector (CE008)	Daily visible emissions observations: Presence of visible emissions	EUFBCOOLER	No
	PM10 / 0.65 lb/hr	40 CFR 52.21 (c) & (d)				
	PM2.5 / 0.65 lb/hr	40 CFR 52.21 (c) & (d)				
FGCORN-DDGS <b>Emission Units:</b> EUCORNPIT, EUCORNELEV1, EUCORNBIN1, EUCORNBIN2, EUCORNBIN3, EUCORNBIN4, EUCORNBIN5, EUCORNBIN6, EUCORNBIN7, EUDDGSPIT, EUDDGSELEV, EUDDGCONV, EURAILLOAD1, EUTRUCKLOAD1	PM / 0.0050 lbs per 1000 lbs of gas	R 336.1331	Fabric Filter Collector (CE001)	Daily visible emissions observations: Presence of visible emissions	FGCORN-DDGS	
	PM10 / 0.56 lb/hr	40 CFR 52.21 (c) & (d)				
	PM2.5 / 0.36 lb/hr	40 CFR 52.21 (c) & (d)				
FGFLOUR <b>Emission Units:</b> EUFLOURELEV, EUFLOURCONV, EUHAMMERMILL1, EUHAMMERMILL2, EUHAMMERMILL3, EUHAMMERMILL4, EUHAMMERMILL5	PM/ 0.0040 lbs per 1000 lbs of gas	R 336.1331	Hammermill-1 baghouse (F-110), Hammermill-2 baghouse (F-111), Hammermill-3 baghouse (F-112), Hammermill-4 baghouse (F-113), Hammermill-5 baghouse (F114)	Daily visible emissions observations: Presence of visible emissions	FGFLOUR	No
	PM10 / 1.10 lb/hr	40 CFR 52.21 (c) & (d)				
	PM2.5 / 0.93 lb/hr	40 CFR 52.21 (c) & (d)				

Emission Unit/Flexible group ID	Pollutant/ Emission Limit	UAR(s)	Control Equipment	Monitoring (Include Monitoring Range)	Emission Unit/Flexible Group for CAM	PAM ? *
FGFERM&DIST <b>Emission Units:</b> EUFERMENTER1, EUFERMENTER2, EUFERMENTER3, EUFERMENTER4, EUFERMENTER5, EUFERMENTER6, EUFERMENTER7, EUFERMENTER8, EUBEERWELL, EUBEERSTRIP, EUBEERSTRIP2, EURECTIFIER, EUSIDESTRIP, EUSIEVE, EUSIEVE2, EUYEAST, EUEVAPORATOR	VOC /19.66 lb/hr	R 336.1225, R 336.1702(a)	Packed-bed wet scrubbers (CE004)	<p>The monitoring for the control device is total water flow and pressure drop across the scrubber.</p> <p>Scrubber liquid flow rate (3-hour average flow rate of minimum 25 GPM with mash online, and for at least 36 hours with mash flow off and 3-hour average of minimum 15 GPM after 36 hours with mash off).</p> <p>Exhaust Temperature (3-hour average temperature less than 65°F).</p> <p>Bisulfite Addition (Minimum 22 GPD for at least 36 hours after mash flow off and shut off bisulfite flow after 36 hours of mash flow off).</p> <p>Differential pressure (3-hour average pressure drop less than 9 inches of water column).</p>	FGFERM&DIST	No

Emission Unit/Flexible group ID	Pollutant/ Emission Limit	UAR(s)	Control Equipment	Monitoring (Include Monitoring Range)	Emission Unit/Flexible Group for CAM	PAM ? *
			Packed-bed wet scrubber (CE014)	<p>Scrubber liquid flow rate (3-hour average flow rate of minimum 45 GPM with mash online, and for at least 36 hours with mash flow off and 3-hour average of minimum 23 GPM after 36 hours with mash off)</p> <p>Exhaust Temperature (3-hour average temperature less than 65°F).</p> <p>Bisulfite Addition (Minimum 22 GPD for at least 36 hours after mash flow off and shut off bisulfite flow after 36 hours of mash flow off).</p> <p>Differential pressure (3-hour average pressure drop less than 9 inches of water column).</p>	FGFERM&DIST	
FGDDGSDRYERS <b>Emission Units:</b> EUDDGSDRYER1, EUDDGSDRYER2, EUTO&HRB, EURTO, EUCENTRIFUGE1, EUCENTRIFUGE2, EUCENTRIFUGE3, EUCENTRIFUGE4, EUCENTRIFUGE5, EUCENTRIFUGE6, EUSTILLAGETANK	VOC / 9.00 lb/hr combined  (Combined refers to TO & HRB stack and RTO stack)	R 336.1225, R 336.1702(a), R 336.1901	Thermal Oxidizer & Heat Recovery Boiler (CE010)	Combustion chamber temperature (3-hour average combustion chamber temperature greater than 800°F with dryers up, not fed; and 3-hour combustion chamber temperature greater than 1454°F with dryers fed more than 45 min).	FGDDGSDRYERS	NO

Emission Unit/Flexible group ID	Pollutant/ Emission Limit	UAR(s)	Control Equipment	Monitoring (Include Monitoring Range)	Emission Unit/Flexible Group for CAM	PAM ? *
			Regenerative Thermal Oxidizer (CE012)	Combustion chamber temperature (greater than 1637°F based on a 3-hour average)		
EUCENTRIFUGE1-6 and EUSTILLAGETANK / FGDDGSDRYERS	VOC / 6.13 lb/hr combined.  (Combined refers to TO & HRB stack and RTO stack)	R 336.1225, R 336.1702(a), R 336.1901	Thermal Oxidizer & Heat Recovery Boiler (CE010)	Combustion chamber temperature (3-hour average combustion chamber temperature greater than 800°F with dryers up, not fed; and 3-hour combustion chamber temperature greater than 1454°F with dryers fed more than 45 min).	FGDDGSDRYERS	NO
			Regenerative Thermal Oxidizer (CE012)	Combustion chamber temperature (greater than 1637°F based on a 3-hour average).		
EUTO&HRB / FGDDGSDRYERS	PM / 4.00 lb/hr	R 336.1331	Thermal Oxidizer & Heat Recovery Boiler (CE010)	Combustion chamber temperature (3-hour average combustion chamber temperature greater than 800°F with dryers up, not fed; and 3-hour combustion chamber temperature greater than 1454°F with dryers fed more than 45 min).	FGDDGSDRYERS	NO
	PM10 / 4.00 lb/hr	40 CFR 52.21 (c) & (d)				
	PM2.5 / 4.00 lb/hr	40 CFR 52.21 (c) & (d)				
EURTO / FGDDGSDYERS	PM / 6.00 lb/hr	R 336.1331	Regenerative Thermal Oxidizer (CE012)	Combustion chamber temperature (greater than 1637°F based on a 3-hour average).		
	PM10 / 6.00 lb/hr	40 CFR 52.21 (c) & (d)				
	PM2.5 / 6.00 lb/hr	40 CFR 52.21 (c) & (d)				

\*Presumptively Acceptable Monitoring (PAM)

EUFB COOLER, the fluidized bed cooler is equipped with a fabric filter (CE008) to control emissions of PM/PM10/PM2.5.

Emission units in FGCORN-DDGS for the corn and dried distiller's grains with soluble (DDGS) area are equipped with a fabric filter (CE001) to control emissions of PM/PM10/PM2.5. Emission units in FGFLOUR, the milling area are equipped with Hammermill-1 baghouse (F-110), Hammermill-2 baghouse (F-111), Hammermill-3 baghouse (F-112), Hammermill-4 baghouse (F-113), Hammermill-5 baghouse (F114) to control emissions of PM/PM10/PM2.5.

Visible emissions will be observed and recorded once daily during daylight hours during operation. Visible emissions would indicate reduced performance of a fabric filter baghouse. Therefore, the presence of visible emissions is selected as the performance indicator for each baghouse. The fermentation and distillation system (FGFERM&DIST) is equipped with a packed bed scrubber for the control of volatile organic compounds. This process has two packed wet bed scrubber units (CE004 or CE014) and the emissions could be controlled by either of the scrubbers. The monitoring for the control device is scrubber liquid flow rate, exhaust temperature, bisulfite addition flow rate and the differential pressure drop across the scrubber. Indicator ranges for these parameters were established during the January 2023 compliance test.

Scrubber water flow was chosen because control efficiency is a function of the absorbing liquid (water). Low water flow may indicate insufficient volume of liquid to effectively absorb the volatile organic compounds in the exhaust gases.

The exhaust temperature is monitored to limit the evaporation of the volatile organic compounds and keep them in the scrubbing liquid.

The bisulfite addition is used to keep the volatile organic compounds in the scrubbing liquid to limit the amount exhausted to the atmosphere.

Pressure drop was chosen as it directly relates to the ability to maintain proper operation of the scrubber. High-pressure drop may indicate plugging or fouling of the packed bed which affects the ability of the scrubber liquid to absorb the volatile organic compounds.

FGDDGSDRYERS, the dried distiller's grains with soluble (DDGS) dryers and centrifugation process is equipped with a thermal oxidizer and heat recovery boiler and a regenerative thermal oxidizer (RTO). The monitoring for the control devices includes the combustion chamber temperature. The combustion chamber temperature was chosen because the destruction efficiency of the thermal oxidizer and heat recovery boiler and RTO is a function of temperature. Proper operation of the thermal oxidizer and heat recovery boiler and RTO can be evaluated based on the retention time of the gas stream within the chamber and the operating temperature. The minimum combustion temperature was established during the January 2023 compliance test.

Please refer to Parts B, C, and D in the draft ROP for detailed regulatory citations for the stationary source. Part A contains regulatory citations for general conditions.

### **Source-Wide Permit to Install (PTI)**

Rule 214a requires the issuance of a Source-Wide PTI within the ROP for conditions established pursuant to Rule 201. All terms and conditions that were initially established in a PTI are identified with a footnote designation in the integrated ROP/PTI document.

The following table lists all individual PTIs that were incorporated into previous ROPs. PTIs issued after the effective date of ROP No. MI-ROP-N6996-2018 are identified in Appendix 6 of the ROP.

PTI Number			
210-01D	210-01E	64-09	175-15B

**Streamlined/Subsumed Requirements**

This ROP does not include any streamlined/subsumed requirements pursuant to Rules 213(2) and 213(6).

**Non-applicable Requirements**

Part E of the ROP lists requirements that are not applicable to this source as determined by the AQD, if any were proposed in the ROP Application. These determinations are incorporated into the permit shield provision set forth in Part A (General Conditions 26 through 29) of the ROP pursuant to Rule 213(6)(a)(ii).

**Processes Not in the Draft ROP**

The following table lists PTI exempt processes that were not included in the Draft ROP pursuant to Rule 212(4). These processes are not subject to any process-specific emission limits or standards.

Emission Unit ID	Description of Emission Unit	Rule 212(4) Citation	PTI Exemption Rule Citation
EUILOSTORAGE	Lubricating and Hydraulic Oil Storage	Rule 212(4)(d)	Rule 284(2)(c)
EUTORCHCUTTING	Portable Torch Cutting Equipment	Rule 212(4)(e)	Rule 285(2)(j)

**Draft ROP Terms/Conditions Not Agreed to by Applicant**

This draft ROP does not contain any terms and/or conditions that the AQD and the applicant did not agree upon pursuant to Rule 214(2).

**Compliance Status**

The AQD finds that the stationary source is expected to be in compliance with all applicable requirements as of the effective date of this ROP.

**Action taken by EGLE, AQD**

The AQD proposes to approve this ROP. A final decision on the ROP will not be made until the public and affected states have had an opportunity to comment on the AQD’s proposed action and draft permit. In addition, the USEPA is allowed up to 45 days to review the draft ROP and related material. The AQD is not required to accept recommendations that are not based on applicable requirements. The delegated decision maker for the AQD is Julie Brunner, ROP Central Unit Supervisor. The final determination for ROP approval/disapproval will be based on the contents of the ROP Application, a judgment that the stationary source will be able to comply with applicable emission limits and other terms and conditions, and resolution of any objections by the USEPA.

State Registration Number  
N6996

**RENEWABLE OPERATING PERMIT**  
**OCTOBER 21, 2024 - STAFF REPORT ADDENDUM**

ROP Number  
MI-ROP-N6996-2024

**Purpose**

A Staff Report dated September 16, 2024, was developed to set forth the applicable requirements and factual basis for the draft Renewable Operating Permit (ROP) terms and conditions as required by Rule 214(1) of the administrative rules promulgated under Act 451. The purpose of this Staff Report Addendum is to summarize any significant comments received on the draft ROP during the 30-day public comment period as described in Rule 214(3). In addition, this addendum describes any changes to the draft ROP resulting from these pertinent comments.

**General Information**

Responsible Official:	Doug DeLand, General Manager 989-286-3903
AQD Contact – District Inspector:	Adam Shaffer, Environmental Engineer 989-225-4789
AQD Contact – ROP Writer:	Shamim Ahammod, Senior Environmental Engineer 586-212-0508

**Summary of Pertinent Comments**

No pertinent comments were received during the 30-day public comment period.

**Changes to the September 16, 2024 Draft ROP**

No changes were made to the draft ROP.